

(12) UK Patent Application (19) GB (11) 2 010 229 A

(21) Application No. 7833744
(22) Date of filing 17 Aug 1978
(23) Claims filed 17 Aug 1978
(30) Priority date
(31) 49098/77
(32) 25 Nov 1977
(33) United Kingdom (GB)
(43) Application published
27 Jun 1978
(51) INT CL²
B42D 9/06
(52) Domestic classification
B8R 413 431 451 471 475
811 T7
(56) Documents cited
GB 1247562
GB 815072
GB 776217
(58) Field of search
B8R
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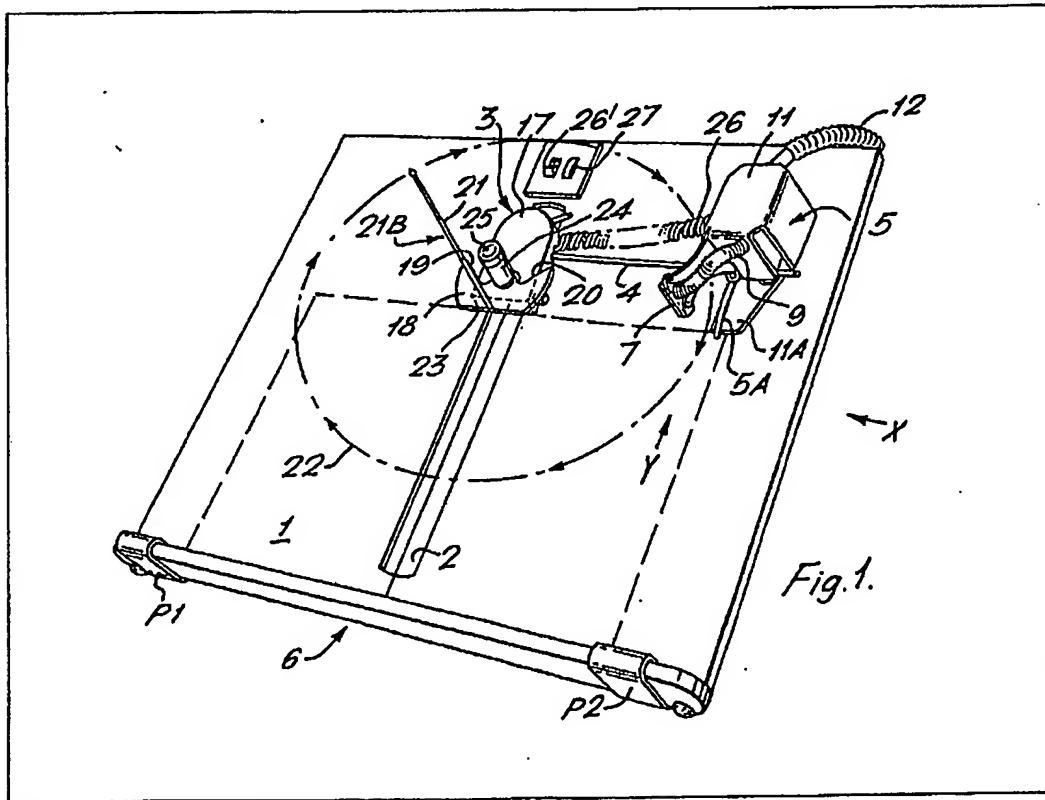
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(64) Leaf turners

(57) The invention relates to devices for automatically turning the pages of a book, magazine or newspaper without the need for manipulation of the pages by hand, to enable e.g. disabled persons to read through a publication. The device comprises a suction or adhesive lifting head 7 for raising the page to be turned, and an arm 21 which rotates in a plane beneath the lifted page and over the centre line of the book, magazine or newspaper to turn the page, and a control mechanism for carrying out the lifting and turning procedures automatically in sequence. Puff or suck pneumatic control may be provided for initiating a turning sequence.

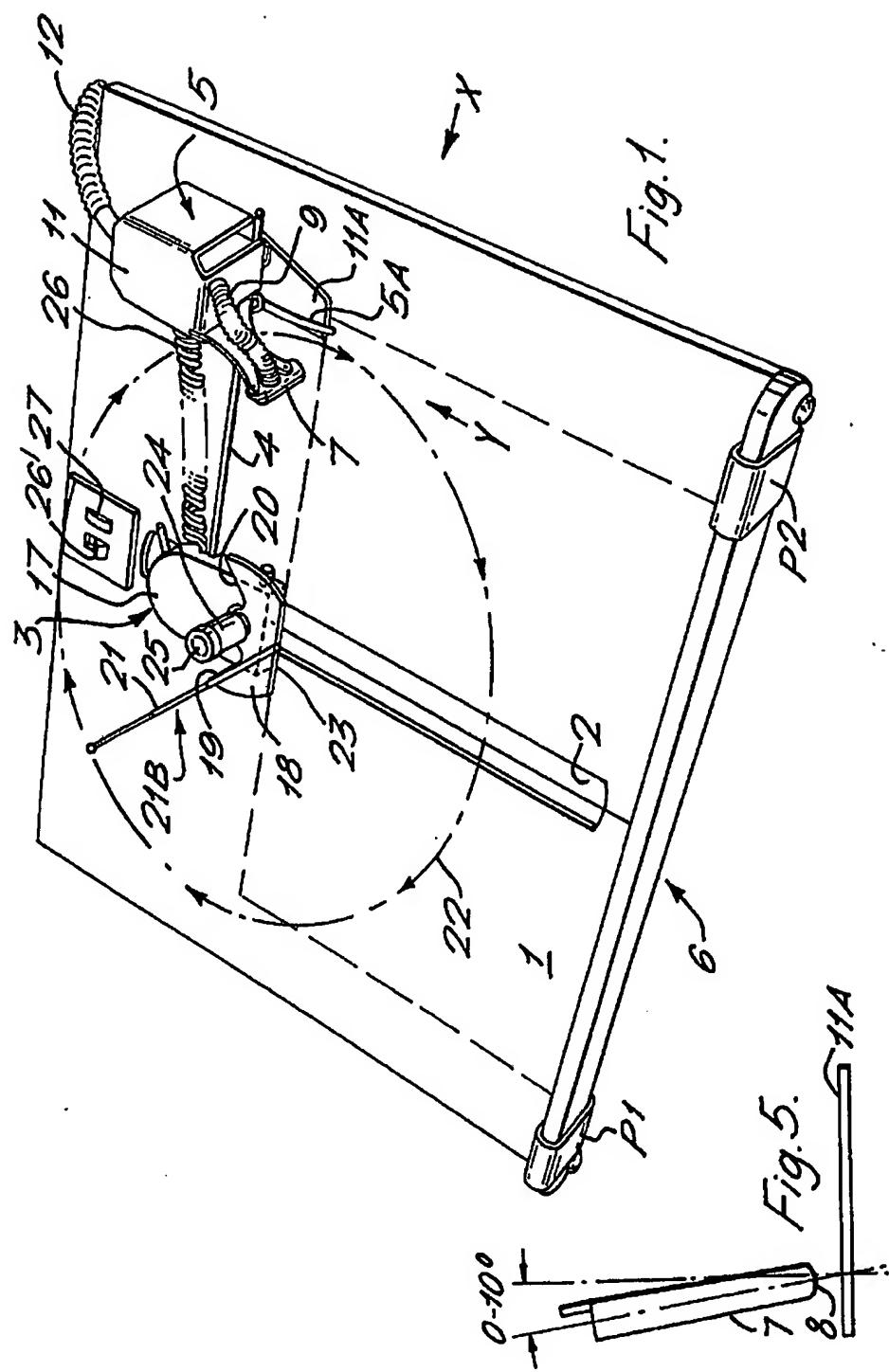
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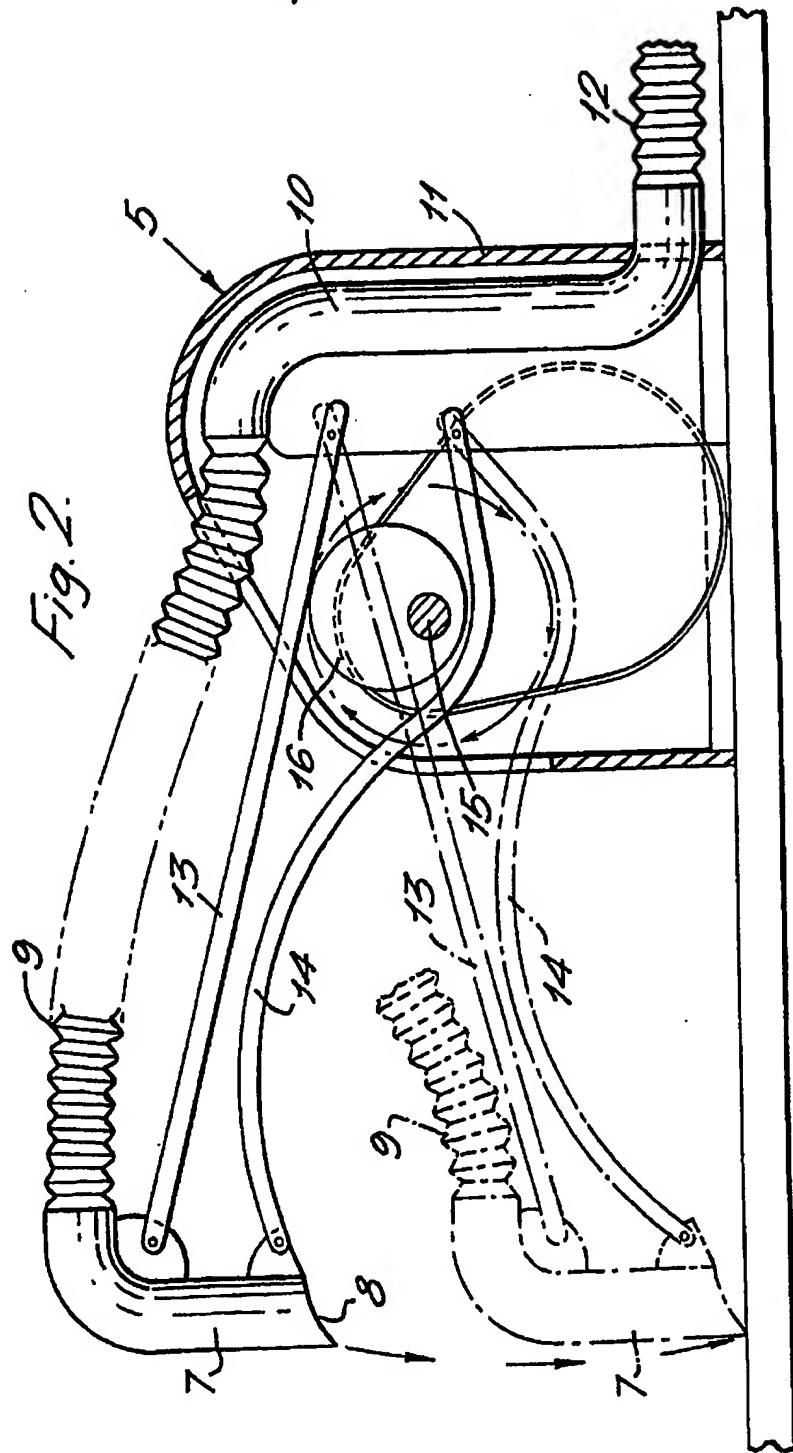
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Fig. 2.



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Fig. 3a.

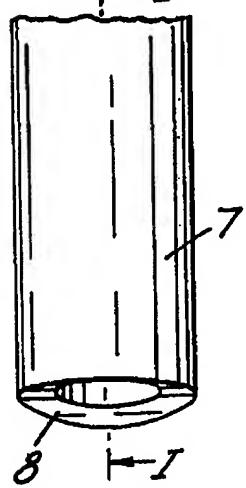


Fig. 3b.

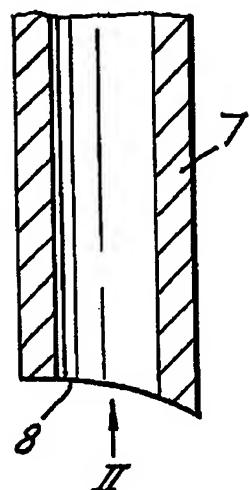


Fig. 3c.

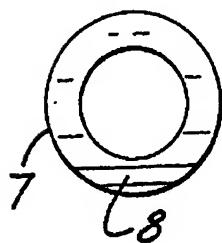
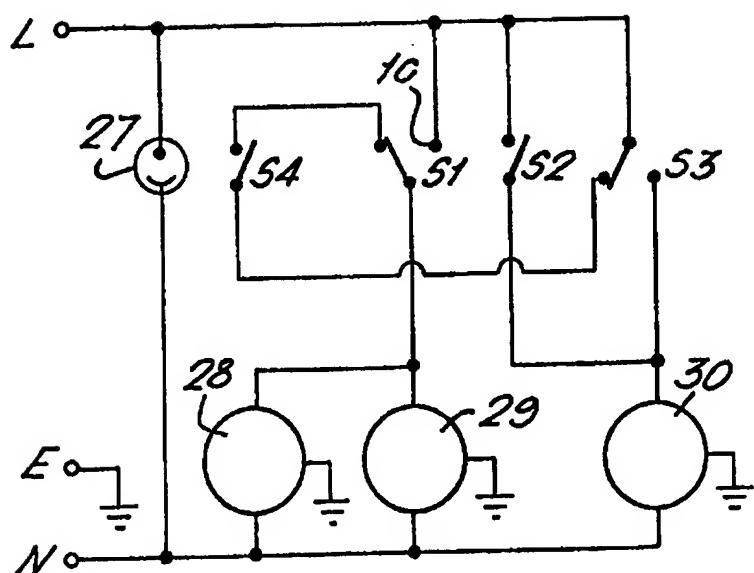


Fig. 4.



SPECIFICATION**Page turning device**

- 5 This invention relates to a device for turning leaves of a book, magazine, newspaper or the like, and is particularly, but not exclusively, aimed at providing a device which will enable disabled persons to read publications such as the aforesaid without having to attempt the dexterous manipulations required when turning leaves by hand.

A known kind of page turner for disabled persons comprises a base for supporting the book or the like, and a cylinder which is drivably mounted for rotation on its axis. In operation the cylinder lies above the page to be turned; as the cylinder rotates it "scuffs" up the page with which it is in contact. The cylinder is also arranged to travel normally to its longitudinal axis whilst "scuffing" across from one side of the book, or magazine to the other, the rotational effect of the cylinder when on the other side of the centre line of the book, magazine or the like being to cancel out the "scuffing" action and turn the leaf down so that its reverse side is now exposed, and on the other side of the centre line the front side of a new page is exposed.

We have found that in the aforesaid devices, due to the difficulty of controlling the pressure of the roller on the leaves to be turned, several pages may 30 be turned at once. This is a particular problem where various publications of different sizes of page, and weight and quality of paper are to be read in succession. As far as we are aware, there is no such page turner which will cater reliably for small books and magazines. The known device moreover does not have the dimensional flexibility which would enable it to accommodate newspapers, even if the pages thereof could be turned efficiently.

An object of the present invention is to provide a 40 device which eliminates or mitigates at least some of the aforesaid disadvantages.

According to the present invention we provide a device for turning the leaves of a book, newspaper, magazine, or the like, which comprises automatic 45 means for lifting at least a marginal edge portion of a leaf from the next succeeding leaf; a moveable arm member which, in operation of the device, is supported for movement in a path beneath a lifted leaf and across the centre line of the book, newspaper, magazine or the like thereby to turn said leaf about said centre line; a motor for driving said arm member in said path; and control means for sequentially operating said lifting means and said arm member.

55 A preferred embodiment of the present invention will now be described, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a page turning device set up for operation;

60 *Figure 2* is a sectional view of the page lifting mechanism of a similar device to that shown in Figure 1;

Figure 3a is a front elevation of a suction nozzle;

Figure 3b is a section on line I-I of Figure 3a;

65 *Figure 3c* is a view in the direction of arrow II of

Figure 3b;

Figure 4 is a diagram of the electrical circuit for the devices shown in Figures 1 and 2; and

Figure 5 is a schematic view of parts of the lifting

- 70 unit of Figure 1 viewed in the direction of arrow Y. Referring to the drawing, Figure 1 shows a page turning device comprising a board 1 having a generally centrally located slot 2. A page turning unit (indicated generally by 3) described in detail below, is secured in position in the slot by suitable clamping means (not shown) or by friction. The unit 3 for reasons explained below, should be located on the board close to the upper edge of the publication to be read, and the slot allows for this flexibility of 75 positioning: the dotted line indicates the position in which say a tabloid newspaper will usually be located for reading using this particular embodiment of the invention.

A rod 4 is fixed to the turning mechanism 3 and as 80 page lifting unit (indicated generally by 5) is releasably clamped thereto by means not shown, the lifting mechanism 5 can be moved to, and clamped at, any position along the rod 4, so that, as explained below, the configuration of the total device can thus 85 be adjusted appropriately according to the size of the publication it is desired to read.

Referring further to Figure 1, in use the publication to be read will first be placed open at the centre pages and the board with its centre line lying along 90 the axis of the slot. Clips P1 and P2 have leaf portions (hidden by the lower wall of the board) which extend over the lower margins of the pages to prevent them from sagging when the board is nearly vertical. A length of elasticated string, secured at 95 one end to the mechanism 3, can then be pulled down over the centre page of the open publication and attached to a suitable fixture at the bottom edge 6 of the board, to hold the publication securely in position. The publication can then be closed to 100 begin reading from the front page. Other possible securing means are, for instance, a thin rod held e.g. by magnets in the bottom edge 6 of the board and the turning unit; the rod may be of adjustable length e.g. telescopic to cater for various sizes of 105 publications. In the case of newspapers for example, it may be found desirable to cover the slot with a board or stiff cardboard to support the pages over the opening.

The lifting unit 5 (and a modification thereof) are 110 shown in more detail in Figures 2 and 3 respectively. Referring to Figure 2 the mechanism comprises a suction nozzle, in the form of a tube 7 with a lower bevelled open end 8, the upper end being connected to a suction plant (not shown) e.g. a fan, via flexible pipe 9 conduit 10 through the housing 11 and flexible pipe 12. The lower end of the suction nozzle 7 preferably has the contours of the upper surface of an aerofoil section as shown in Figure 3.

It is envisaged that the nozzle may alternatively 115 have a soft rubber mouth piece, or have a normal end face, in the latter case the nozzle may preferably be connected to the suction pipe through a knuckle joint.

The suction nozzle 7 is pivotally connected at its 120 upper and lower ends respectively to the ends of

upper and lower arms 13, 14. The other ends of the arms 13, 14 are pivotally connected, in spaced relation in the same plane as the other ends, to supporting pillar 15, or a side wall of the housing 11. The spacing between the ends of the arms at the nozzle end and the pillar are equal; this arrangement is such as to ensure that whatever the height of the nozzle above the plane of the board the nozzle will maintain the same angle of attack thereto, and thus 10 will present the same angle of attack to the upper leaf of e.g. a book, regardless of the thickness of the book.

A coil spring is provided connecting the lower arm and the housing 11 which urges the nozzle 7 towards the board 1. Movements of the arms, and the nozzle 7, is effected, in this embodiment, by a cam mechanism described below.

Attached to the bottom of the housing 11 is a flat plate 11A which, as shown in Figure 6 more or less lies in a plane at 0-10° to the plane including the pivotal arms of the turning unit. In the arrangement shown in Figure 1 the lifting unit 5 is located with the plate 11A contacting the board 1. This arrangement ensures that the suction nozzle mouth will 20 move in a path which approximates to that of the corner of a page being turned, i.e. the arc of a circle whose centre is on the fold line of the newspaper and whose radius is the width of the page. Viewed from the direction of arrow X the nozzle will appear 25 to move vertically.

A pressure clip 5A tabs down the pages and locates them in register with the nozzle 7.

Mounted in the housing is a cam timer (not shown). This may be of commercially available 35 construction but for convenience will be described below briefly.

The time includes a motor, e.g. a synchronous motor which can be driven off mains voltage or a battery e.g. a 12 volt battery, the motor drives a 40 shaft 15 on which are mounted three cam wheels (only one of which is shown in Figure 2), the others being utilised for purposes to be described below.

The cam wheel 16 shown in Figure 2 is a circular wheel mounted eccentrically on the shaft 15. In 45 operation, as the shaft 15 rotates cam wheel 16 will coat with the lower surface of upper arm 13 to raise it, and the nozzle 7, from the lower position (represented by ghost lines) in which it is held by the spiral spring (not shown).

50 The other cam wheels are arranged to coat with switches, preferably micro-switches (not shown) which energize the suction fan and the turning unit 3 respectively. The timer controls the sequence of operation which we will describe in more detail 55 below.

The turning unit 3 comprises a housing 17 and has e.g. fixtures for clamping the unit firmly in the slot. A motor (not shown) e.g. a synchronous motor arranged to run off mains voltage is located in the 60 housing 17. The motor drives a shaft (not shown) on which is mounted a plate 18, e.g. of transparent plastics material. The plate 18 is roughly part circular and mounted on the shaft at its centre; a segment defined generally by two chord edges 19, 20 is 65 cut away.

A rod 21 is firmly attached along chord edge 19 and extends well beyond the plate 18. The rod is preferably of adjustable length e.g. it may be telescopic or provided as a set of interlocking parts. In 70 operation the motor in housing 17 will drive the rod 21 through plate 18 in a circular path as shown by the broken line (22) from a rest position 21B. In actual operation, this movement will thus take the rod from position 21B in a complete circle across 75 and beneath the upper edge of a leaf e.g. a page of a newspaper, across the centre fold of the newspaper back to the position 21B beyond the upper edge of a leaf on the other side of the centre fold.

The length of the rod should ideally approximate 80 to the length of the leaf to be turned. In the illustration it is about 75% the length of the page. The most convenient length in practice will vary according to the physical characteristics of what is being read.

The plate 18 also has a segment cut away which is 85 defined by a chord 23.

Mounted on the motor shaft, above the plate, 18 is a pressure knob 24. This contains a spring (not shown) which acts between the inside surface of the top of the knob 25 and the plate 18 to exert a downward pressure on the plate 18. In the case of thick publications, that is books rather than newspapers, this will bring the plate into contact with the upper edges of the pages of the book and prevent them from springing over. In the case of e.g. newspapers 95 in a device in which the board is almost vertical it will serve to prevent a turned page from sagging. The use of the plate 18 means that, for instance in the case of the illustrated embodiment, the board may be supported at up to 85° to the horizontal.

100 The motor of the page turning unit is electrically connected by lead 26 to the source of electric current through a switch e.g. a first micro-switch in the housing 17 and also through a micro-switch in housing 5. The electric circuit will now be described 105 in detail.

In the current model a master switch 26 is provided for energising the circuit; in the energized state a warning neon light 27 will be illuminated.

The circuit (which illustrates the rest position of the 110 device) shows a fan motor 28; cam timer and suction head motor 29, and turning unit motor 30 arranged in parallel; cam operated switches S1, S2, S3, are provided to complete or break the circuit for energising the motors. A further switch S4 is provided for actuating the device; this may be of any conventional type but is preferably a single pole switch such as a pneumatic pressure switch for hand or chin operation, or by mouth (puff) control, or by vacuum to mouth (suck) control.

115 In the rest condition illustrated switches S1 and S2 are open; switch 3 is closed, but the circuit to the cam timer motor 29 is not completed because switch S4 is open. A cycle of operation for turning a page, starting from the rest condition will now be 120 described:

1. In the rest condition arm 21 will be in position 21B and nozzle 7 elevated under the influence of the cam wheel 15 in its stopped position;
2. Switch S4 is closed by the user; this completes 130 the circuit through S3, S4 and S1 for motors 28 and

29;
 3. Switch S1 is immediately switched by a cam wheel to contact 1c so that current to motors 28 and 29 is maintained after switch S4 is released. The
 5 motor fan is now operating and the nozzle 7 is moving downwards towards the board as cam wheel 15 is rotated.
 4. The nozzle 7 eventually approaches sufficiently or contacts the upper leaf for the leaf to become
 10 attached to the nozzle 7 under the suction conditions generated at the nozzle mouth.
 5. The nozzle 7 then begins upward movement pulling the leaf clear of the pressure clip 5A as the cam wheel 15 continues its rotation; the top page is then
 15 lifted from the next succeeding page.
 6. At a later stage of the cycle cam switch S2 is closed momentarily, and the motor 30 is energized. As the arm begins its movement cam switch S3 is actuated and the motor 30 is then connected for
 20 continuous supply of electric current. Switch S3 may be actuated by movement of the arm but may also be operated by the cam timer, i.e. it may incorporate a cam wheel driven by motor 29; it will be apparent, therefore, that cam switch S2 can, if
 25 desired, be omitted by appropriate modification of the circuit shown.
 7. The arm is now moving from rest position 21B in the direction indicated by the arrows;
 8. During the movement of the arm cam switch 1 is
 30 reversed (to the position shown in Figure 4) stopping suction and the cam timer motor 30.
 9. When arm 21 has again reached position 21B cam switch S3 is reversed to the position shown. Arm motor 30 stops and the device is now once
 35 again in the rest position. It will be apparent that a turning cycle cannot be commenced until the turning arm cycle is complete and cam switch S3 is in the position illustrated.
 Conveniently a complete cycle (for turning one
 40 leaf) may take approximately 5 seconds.
 Among material for which the device is suitable are paperback books, hardback books, magazines, newspapers and spiral and ring bound matter.
 For best results in reading newspapers the news-
 45 paper should not be creased (apart from the centre fold).
 It is envisaged that the device can be used to turn pages also in the reverse direction; such a device may, for example, have two page lifting units and
 50 switches in the electrical circuit for reversing the direction of rotation of the turning arm.
 In such an embodiment another turning arm 21 will be attached to chord edge 20 for best results.
 Although in the illustrated embodiment the lifting
 55 unit uses suction to lift the leaf, it is envisaged that an arm having an adhesive pad, e.g. coated with a silicone release resin or the material manufactured by Bostik Limited under the trade mark BLU-TACK.

60 CLAIMS

1. A device for turning the leaves of a book, newspaper, magazine or the like, which comprises:
 a) automatic means for lifting at least a marginal
 65 edge portion of a leaf from the next succeeding leaf;

b) a moveable arm member which, in operation of the device, is supported for movement in a path beneath a lifted leaf and across the centre line of the book, newspaper, magazine or the like, thereby to
 70 turn said leaf about said centre line;
 c) a motor for driving said arm member in said path; and
 d) control means for sequentially operating said lifting means and said arm member.
 75 2. A device according to Claim 1, wherein said lifting means includes a suction nozzle or an adhesive pad.
 3. A device according to Claim 2, wherein the mouth of the suction nozzle or adhesive pad is
 80 adapted to move in operation of the device in a path inclined towards the centre line and which defines, with an imaginary line normal to the centre line and in the plane of the leaf to be turned, an angle of 80 to 90°.
 85 4. A device according to Claim 3, wherein said suction nozzle has bevelled mouth or a mouth controlled substantially as shown in Figure 3 of the accompanying drawings.
 5. A device according to any one of Claims 2 to
 90 4, wherein the automatic lifting means comprises an arm supporting the suction nozzle having a camming surface, and a cam wheel driven by a motor.
 6. A device according to any one of Claims 2 to
 95 5, further including a motor driven fan for generating negative pressure at said suction nozzle.
 7. A device according to any one of Claims 1 to
 6, wherein said lifting means includes a spring member for releasably holding the edge of a plurality of leaves in register with said lifting means.
 100 8. A device according to any one of the preceding claims, wherein the said arm member is mounted for movement in an arcuate path.
 9. A device according to any one of Claims 1 to
 105 8, wherein the arm is of adjustable length.
 10. A device according to Claim 9, wherein the arm is telescopic.
 11. A device according to any one of the preceding claims, wherein the control means is operative
 110 to return the arm after a turning operation, to its starting position.
 12. A device according to any one of Claims 1 to
 115 11, including a plate member associated with the arm, which in operation is located over the leaves of a book, newspaper, magazine or the like, thereby to hold them in a substantially fixed position for reading.
 13. A device according to any one of the preceding Claims wherein the control means comprises
 120 cam wheels driven by a common motor and engageable with switches for operating the motor for the arm member sequentially with the lifting means.
 14. A device according to Claim 13, when dependant on Claim 6, including a cam wheel engageable with a switch for operating said fan.
 15. A device according to any one of the preceding Claims wherein the lifting means and the arm member are mutually mounted on a rail member, the distance therebetween being adjustable.
 130

16. A device according to any one of the preceding claims, further including a frame or base for supporting a newspaper, book, magazine or the like, and attachment means for locating the lifting means, arm member and newspaper, book, magazine or the like in register.
17. A device according to Claim 16, wherein the attachment means includes a slot within which the support for the arm member is locatable at a pre-selected position.
18. A device according to any one of the preceding claims, including means for securing a newspaper, magazine, book or the like is a substantially fixed position with respect to the lifting means and arm member.
19. A device according to any one of the preceding claims, in which the sequential operation is actuatable by a pneumatic pressure switch for hand or chin operation, or by mouth (puff) control, or by vacuum to mouth (suck) control.
20. A device according to Claim 1, substantially as described with reference to the drawings herein.

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from which copies may be obtained.

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